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ARITHMETIC.

Conducted by B. F. FINKEL, Kidder, Mo. All contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

29. Proposed by R. H. YOUNG, West Sunbury, Pennsylvania.

An interest bearing note dated August 1st, 1892, was discounted at 90 days at 8%. The face of the note was $750, and the proceeds $759.982: What was the date of discount?

Solution by Professor G. B. M. ZERR, Principal of High School, Staunton, Virgina, and P. S. BERG, Apple Creek, Ohio.

90 days + 3 days grace = 93 days.
Interest on $1.00 for 93 days at 8% = $.0206⅔.
$1.00 − $.0206⅔ = $.9793⅓ = proceedr of $1.00
$759.982 ÷ .9793⅓ = $776.0197, the amount of the note at the end of the 90 days.
$776.0197 − $750. = $26.0197, interest.
Interest on $750 for 1 year at 6% = $45.00.
$26.0197 ÷ $45 = 6 months 27 days.
6 months, 28 days − 90 days = 3 months, 28 days.
August 1, 1892 + 3 months 28 days = November 29, 1892.
∴ The note was discounted November 29, 1892.

30. Proposed by F. P. MATZ, M. Sc., Ph. D., Professor of Mathematics and Astronomy in New Windsor College, New Windsor, Maryland.

While dressing a fifty-cent chicken, a poulterer found a fifty-dollar diamond in the chicken's gizzard. He sold the chicken at a profit of 25cts., changed with good money the conterfeit ten-dollar bill handed him by the unknown purchaser, and realized 50% of the estimated value of the dimond. What per cent. of gain, or loss, did the poulterer make? Suppos the purchaser of the chicken and of the diamond had been one person, what per cent of gain, or loss, would he have made after selling the diamond for $25 in good money?

I Solution by the PROPOSER.

The poulterer paid 50 cents for the chicken and gave away $9.25 in change. His total loss is, therefore, $9.75. His total gain, the amount realized on the dimond, is $25.00. Hence the poulterer's net gain is $15.25, which is 152½% of the capital invested by him. The unknown purchaser, investing $25, had aftea his transactions were made, a chicken the market-value of which was 75 cents, and also $9.25 in good money as change. On his dimond-transaction, he neither gained nor lost. Therefore, the unknown purchaser's total gain is $10., which is 40% of the capital by him invested during his transactions.

Different interpretations of the conditions of the problem, may lead to different results.

II. Solution by P. S BERG, Apple Creek, Ohio.

50 cents, cost of chicken+\$9.25, change given to purchaser of chicken =\$9.75, amount paid by poulterer. 50% of \$50=\$25, amount received by poulterer. \$25−\$9.75=\$15.25 gain. \$15.25÷\$.50×100=3050. Therefore the poulterer gained 3050%.

In the second condition the purchaser makes \$20, and the cost is 75 cents, therefore the gain per cent. is 10÷.75=1333⅓.

An excellent solution with a different result from either of the above was received from *FRANK HORNE*, a former student of Kidder Institute, Columbia, Missouri.

PROBLEMS.

38. Proposed by J. A. CALDERHEAD, B. Sc., Superintendent of Schools, Limaville, Ohio.

What must be the thickness of a 36-inch shell, in order that it may weigh 1 ton; supposing a 13-inch shell to weigh 200 pounds, when two inches thick?

39. Proposed by P. C. CULLEN, Superintendent of Schools, Brady, Nebraska.

A, *B* and *C* start from same point at same time. *A* north at rate of three miles per hour, *B* east at rate of four miles and *C* west at rate of five miles per hour. *B* at end of two hours starts at such an angle as to intersect *A*. How long after starting must *C* start north-west in order to meet *A* and *B* at common point?

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ALGEBRA.

Conducted by J. M. COLAW, Monterey, Va. All contributions to this department should be sent to him.

SOLUTIONS TO PROBLEMS.

27. Proposed by A. H. BELL, Hillsboro, Illinois. (The problem from H. C. WILKES, Murrayville, West Virginia.)

An oarsman in rowing a boat down stream 7 miles from *A* to *B* and then back requires 12 minutes longer time, than commencing from *B*, and rowing up and back; the rate of speed for the 1st half of the time is 5 miles per hour, and for the 2nd half of the time is 4½ miles per hour. Required the current.

1. Solution by H. C. WILKES, Murrayville, West Virginia.

Let $5+x=$rate down stream; and $5-x=$rate up.

$7+7\left(\dfrac{5+x}{5-x}\right)=\dfrac{70}{5-x}=$length of continuous trip down=in time to trip down and up.

$7+7\left(\dfrac{4\frac{1}{2}-x}{4\frac{1}{2}+x}\right)=\dfrac{63}{4\frac{1}{2}+x}=$length of continuous trip up=in time to trip up and down.